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Influence of the structure of nonionic surfactants and the length of alkyl substituents of calix[4]resorcinarenes on their solubility, acid-base, and complexation properties

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Abstract

Regularities of solubilization of calix[4]resorcinarenes (H8L) with the variable length of hydrophobic radicals (R = CH3, C 3H7, C5H11, C7H 15, C8H17, C9H19, C 11H23) by the micelles of nonionic surfactants Triton X-100 and Triton X-405 in aqueous solutions were studied using solubility measurements. It was found that the solubilization capacity of surfactant micelles with respect to H8L and [H4]4- depends on the extension (thickness) of their polar layers. It was shown by means of potentiometric titration that, in solutions of nonionic surfactants, the constants of the interaction between tetraanions [H4L]4- and tetrametylammonium ions depend on the structure and concentration of nonionic surfactants and the hydrophobicity of H8L molecules. A change in the affinity of the [H4L]4- anions for protons and tetramethylammonium cations in nonionic surfactant solutions was revealed in relation to the length of substituents R and reagent concentrations.

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